

Feed the Future Innovation Lab ***For Collaborative Research on Nutrition - Asia*** **Harvard School of Public Health -** **Annual Report - Year 3**

Feed the Future Innovation Lab

For Collaborative Research on Global Nutrition

Annual Report ***Harvard School of Public Health*** ***Year 3 (2012-2013)*** ***Feed the Future Innovation Labs for Collaboration Research-Asia***

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I) Executive Summary

The work of the Harvard School of Public Health (HSPH) and its partners in Nepal focuses on understanding the complex relationships between diet, socioeconomic status, nutritional status, and health. During Year 3 of our work for the Feed the Future Innovation Lab, we completed a follow-up survey of mother-child pairs, which will enable us to better understand the potential links between maternal diet in early childhood life and nutritional outcomes. We also worked with colleagues at the Institute of Medicine in Nepal and colleagues from Norway to field an additional component of the survey assessing the cognitive development of children at six years of age—an addition that will enable us to explore many topics of relevance to the 1,000 Days Initiative and efforts to understand the importance of nutrition in early childhood and implications for later development. We also completed and submitted several papers for peer-review journals from the baseline survey and continued to work closely with our colleagues in Nepal to develop capacity related to the analysis of nutrition data.

II) Program Activities and Highlights

Our research team is composed of members from the Harvard School of Public Health, the Institute of Medicine at Tribhuvan University in Nepal, and the University of Bergen in Norway. In Year 3 of the project our research activities involved: (1) analyzing results from a baseline survey conducted among 500 mother-infant pairs in Bhaktapur, Nepal; (2) implementing a follow-up survey of the same households; and (3) building the capacity of our colleagues in Nepal to undertake research related to nutrition, agriculture, and health.

The main objectives of our research activities are as follows:

- Improve methods used to measure diet in Nepal;
- Strengthen understanding of the links between diet, food security and nutrition status in mothers and children in Nepal; and
- Capacity building of IOM at Tribhuvan University, our main organizational partner in Nepal.

At the end of Year 2 of the project we had designed the follow-up survey, received Institutional Review Board (IRB) approval from relevant institutions, and hired the staff to implement the survey. One exciting development that occurred since our last report is that our colleagues from Norway received a grant from GC Rieber Research Fund, a private Norwegian research fund, that allowed us to also add assessment of cognitive development outcomes among the same children included in our follow-up survey.

Rather than pushing forward that immediate collection of data over a two-month period, as originally planned, we therefore decided to spread out data collection over the course of the year (since the assessment of children's development had to be conducted by trained specialists and conducted at a specific age following the baseline survey). An additional benefit

of collecting data over the entire year was that we now have the ability to examine seasonal patterns of dietary consumption in the follow-up survey.

Data collection from the original households is now complete. We were able to collect data on 367 of the original 500 households.

III) Key Accomplishments

- We completed data collection for the follow-up study of original women and children in September 2013.
- One research papers based on our work in Bhaktapur was completed and submitted to journals and three more are nearly completed (details below).
- In addition, one letter to the editor drawing on our work in the Innovation Lab was recently accepted for publication in the *Journal of Maternal & Child Nutrition*.
- We produced two research-to-action briefs
- Our colleagues from Norway were able to raise complementary funding to collect data on cognitive development outcomes of the children in our survey. This will enhance the analyses that we are able to do, as we will be able to link nutrient and food intake as well as nutritional status with cognitive development outcomes. The primary person leading this research in Nepal is Dr. Merina Shrestha, who also attended coursework at HSPH last summer.

IV) Research Program Overview and Structure

Our work involves strong collaboration with colleagues at the Institute of Medicine in Nepal and colleagues at the University of Bergen, Norway. All partners have a role in the design and implementation of research and the drafting of research manuscripts.

V) Research Project Reports

In our Year 3 Work Plan we had outlined a number of paper topics that we planned on working on over the coming year. We have significantly advanced most of these topics, though the direction of some topics changed as the analyses evolved. An update on papers (numbered as originally listed in the Work Plan) and current status follows. Drafts of the papers are attached in the Annex:

Paper 1. Maternal anemia and iron deficiency and relationships with dietary intake:

This paper was submitted to the *British Journal of Nutrition* and received favorable reviews. We are in the process of revising and resubmitting the paper for potential publication in that journal.

Paper 2. Dietary diversity scores and probability of nutrient adequacy:

This paper is nearly completed for submission. The primary author went on maternity leave in August 2013 and was in the process of incorporating the feedback of other authors on the paper. We expect that the paper will be submitted within the next two months.

Paper 3. Dietary diversity scores and their relationship to anemia and anthropometry:

This paper is nearly completed and will be submitted to the *Journal of Nutrition*. The manuscript emphasizes how correcting for within-person measurement error can strengthen the association between dietary measures and nutritional status.

Additionally, we wrote a letter to the editor of the *Journal of Maternal & Child Nutrition* about the application of this concept to infant and young child feeding indicators, with the support of this grant, which was accepted without revision and should be published within the coming months.

Paper 4. Maternal dietary patterns and anthropometric indicators in mothers and children:

Data analysis for this paper was unfortunately held up because of the delays in collecting follow-up data. Now that data collection is complete, we are in the process of analyzing the data for this paper. Early results from the follow-up survey, presented by Ram Chandyo at the Scientific Symposium in Nepal, suggest that the prevalence of overweight women in our study now exceeds 43% (also written up in the brief brief). We plan to use our dietary intake and socio-economic data as an opportunity to analyze the factors that are associated with the change in overweight individuals in this population.

Extra Paper: Anemia and iron deficiency are three-fold higher among breastfed infants than their mothers in Bhaktapur, Nepal

This paper, led by Ram Chandyo, explores the prevalence and risk factors for iron deficiency and anemia among lactating women and their infants.

VI) Capacity Building

Two students attended summer courses at the Harvard School of Public Health. Dr. Arun Sharma is a pediatrician and lecturer at the Institute of Medicine. He was able to develop skills in the analysis of nutritional data that he plans to use in publishing papers and in his teaching of undergraduates and graduate students. Dr. Manjeswari Ulak has been part of our research group in Bhaktapur since the start of the Innovation Lab work in Nepal. She took coursework related to Global Nutrition and during her time spent in Boston, worked with our team on moving forward with analyses for a manuscript on vitamin B12 status of children in Bhatkapur using our project data.

VII) Lessons Learned

Prior to implementing the follow-up survey, we undertook a quick study of 50 households to estimate how many of the original 500 households we might be able to identify at follow up. From this study we estimated that we would be able to find 400 or the original 500 households. We ultimately found 367 households, since more households than expected had moved out of the area. We suspect that much of this migration was due to the rapid growth and

development of the Kathmandu Valley. Future longitudinal studies in urban areas should take into account high potential for population movement. Interestingly, our initial results from the follow-up study suggest that selection bias toward better-off households is not as great as we had anticipated—our analyses will use sophisticated methods such as inverse-probability weighting to understand and account for potential selection bias.

As one of the few cohort studies to be conducted in urban areas in South Asia, the willingness of households to continue to participate in the study was uncertain, particularly since we requested blood samples and extensive participation in cognitive development assessments. However, the strong relationship built between our Nepali collaborators and the community of municipal Bhaktapur resulted in high rates of participation among the families we were able to find.

Another major lesson learned relates to our team's ability to adapt and translate the Ages & Stages 3 Questionnaire (ASQ-3) for use in a Nepali context. The ASQ-3 has been validated for use in Western countries, and our colleagues have used it in India as well. To our knowledge, our team's adaptation and translation of the ASQ-3 is the first for the Nepali context, and our preliminary findings indicate that the tool can be appropriately used in Nepal. In addition to the ASQ-3, we also assessed child development using two "gold standard" assessment tools—the Bayley-III & NEPSY-II (A Developmental NEuroPSYchological Assessment), and we plan to formally validate the ASQ-3 against these "gold standards." The ASQ-3 will likely prove a promising tool that could be used in surveys and assessments in low-resource settings because of its quick completion (20 minutes) and the fact that it can be conducted by a trained field worker.

VIII) Presentations and Publications

Dr. Ram Chandyo presented on "Socioeconomic status, food security and anemia among mothers in Bhaktapur, Nepal" at the "Science and Policy for Health, Agriculture, Nutrition & Economic Growth" Scientific Symposium in Nepal.

A letter to the editor, entitled "Is the strength of association between indicators of dietary quality and the nutritional status of children being underestimated?" about the need to address measurement error in the measurement of dietary diversity scores was submitted to and accepted by the *Journal of Maternal & Child Nutrition*.

Two briefs were prepared based on our work.

In addition, one manuscript was submitted to a peer review journal and three are near completion.